4.6 IMPACTS ON NOISE

This section presents an analysis of the noise impacts associated with the construction and operation of the Proposed Action or its alternatives. For details of this analysis, consult the Air and Noise Modeling Technical Report prepared by Baker (1999c). For an explanation of the units of noise measurement used in this impact analysis, see Section 3.6.1.

This impact analysis primarily focused on impacts to the noise environment due to increases in traffic volumes occurring by the design year, 2010. The ROI selected for the analysis of direct impacts from traffic noise covered the areas immediately surrounding the alternatives. However, the analysis employed a travel demand forecast model used by the Gulfport Regional Planning Commission (GRPC) that encompasses all developable land of all land use types in the Mississippi Gulf region. Therefore, since the land area and usage covered in the modeling is so extensive, all types of impacts on the noise environment are accounted for in the modeling – indirect and cumulative, as well as direct. Additionally, it can reasonably be assumed that the traffic volume increases predicted by the model subsume the maximum traffic volume increases expected as a result of implementing Alternatives 2, 3, 4, and 5.

For off-site sound sources, the description of the Proposed Action and its alternatives represent the full extent of probable impacts on noise from various types of land uses such as commercial, retail, hotel, marine, and special events. For on-site sources, however, changes to proposed operations cannot be predicted at this time. These changes would most likely necessitate additional environmental reports. Therefore, indirect and cumulative impacts to the sound level environment as a result of on-site sound level sources are not applicable.

4.6.1 Impacts on Noise Conditions by Construction Activity

The construction of Alternatives 2, 3, 4, and 5 would result in intermittent, short-term noise effects that would be temporary, lasting for the duration of the noise-generating construction activities. Noise-generating construction activities would include excavation and grading, utility construction and paving, and frame building.

The specific types of equipment that would be used during these construction phases are not known at this time. Excavation and grading would normally involve the use of bulldozers, scrapers, backhoes, and trucks. Utility construction usually requires the use of backhoes. The construction of buildings would likely involve the use of pile drivers, concrete mixers and pumps, saws, hammers, and cranes and forklifts. Typical sound levels from construction equipment are listed in Appendix G, Table G-2. Construction activities need to follow the Health and Sanitation rules of Section 11-1-4 (9) of the Biloxi Code (City of Biloxi, 1992), which contains construction ordinances addressing the creation, demolition, alteration, and repair of any buildings during certain time periods.

4.6.2 Impacts on Noise Conditions by Traffic Volume

The primary noise impacts from implementation of the Proposed Action or its alternatives would result from increases in motor vehicle volumes on local roadways. To assess the impacts of predicted future traffic noise levels, the analysis used MDOT's Highway Traffic Noise Policy definitions of traffic noise impacts. According to the Policy, traffic noise impacts occur when predicted traffic noise levels "approach or exceed" the Policy's Noise Abatement Criteria (NAC) (listed in Table 3.6-1 in Section 3.6); furthermore, the criteria hold that a 15-dBA or greater increase over the *existing* level constitutes a substantial impact (MDOT, 1998). Since the law does not require it, the analysis did not carry out a comparison of levels predicted from the "build" alternatives with those predicted from the No-action Alternative.

As described in Section 3.6, actual, existing noise levels were measured at six representative sites during peak traffic hours in the vicinity of the Alternatives 2, 4, and 5 site. These Leq dBA values were used to calibrate a MDOT/FHWA STAMINA 2.0 Model, which was then used to estimate existing noise levels at 70 potentially noise-affected receptor sites. For the impact analysis, the calibrated MDOT/FHWA STAMINA 2.0 Model was used to predict noise levels in design year 2010 at the 70 sites under the No-action Alternative and under Alternatives 2, 4, and 5. The model was used in conjunction the GRPC travel demand forecast model, which provided the traffic volume outputs for the analysis. Results for all 70 sites are tabulated in Appendix G, Table G-1. (The methodology for Alternative 3 is described later.)

Alternatives 2, 4, and 5

Leq noise levels at the 70 receptor sites under Alternatives 2, 4, and 5 would be 2 to 5 dBA higher in 2010 than existing noise levels at the same sites. Thus, the model predicted that no substantial traffic noise impacts (i.e., 15-dBA or greater increases over existing levels) would occur in design year 2010 as a result of implementation of Alternatives 2, 4, or 5.

The model did predict that traffic noise levels would approach or exceed NAC levels at 10 sites, of which six are NAC Category B sites and four are NAC Category C. Table 4.6-1 provides the results for these 10 sites. For noise level measurements for all 70 sites, refer to Table G-1 in Appendix G. Although Table 4.6-1 contains data for 14 sites, only ten of them are sites whose noise levels exceeded/approached NAC levels under Alternatives 2, 4, and 5. The four additional sites, in bold text and asterisked in the table, exceeded/approached NAC levels only under the No-action Alternative.

Table 4.6-1
Noise Levels for Sites Where Traffic Noise Levels are Predicted to Approach or Exceed NAC Levels in 2010 under Alternatives 2, 4, and 5 and under the No-Action Alternative

NAC Category	Location & Facility	Receptor Distance from US 90 (m [ft])	Leq dBA as listed in 23 C.F.R. 772	Estimated Existing Leq dBA	Predicted Leq dBA	Does est. Leq dBA approach or exceed 23 C.F.R. 772 NAC?	Does increase 15 dBA and thus constitute a substantial impact by exceeding?
West of the resort and abutting US 90 to the north							
B	Beauvoir House historic structure	44 (143)	67	65	No-Build: 67 Alt. 2: 69 Alt. 4: 69 Alt. 5: 69	No-Build: Yes Alt. 2: Yes Alt. 4: Yes Alt. 5: Yes	No-Build: No Alt. 2: No Alt. 4: No Alt. 5: No
B	Beauvoir House historic structure	58 (191)	67	64	No-Build: 66 Alt. 2: 68 Alt. 4: 68 Alt. 5: 68	No-Build: No Alt. 2: Yes Alt. 4: Yes Alt. 5: Yes	No-Build: No Alt. 2: No Alt. 4: No Alt. 5: No
B	Beauvoir Historic structure	37 (120)	67	67	No-Build: 69 Alt. 2: 71 Alt. 4: 71 Alt. 5: 71	No-Build: Yes Alt. 2: Yes Alt. 4: Yes Alt. 5: Yes	No-Build: No Alt. 2: No Alt. 4: No Alt. 5: No
B	Beauvoir Administrator's residence	54 (178)	67	64	No-Build: 66 Alt. 2: 68 Alt. 4: 69 Alt. 5: 69	No-Build: No Alt. 2: Yes Alt. 4: Yes Alt. 5: Yes	No-Build: No Alt. 2: No Alt. 4: No Alt. 5: No
C	Denny's Restaurant on US 90	8 (27)	72	75	No-Build: 77 Alt. 2: 79 Alt. 4: 79 Alt. 5: 79	No-Build: Yes Alt. 2: Yes Alt. 4: Yes Alt. 5: Yes	No-Build: No Alt. 2: No Alt. 4: No Alt. 5: No
C	Beavoir Beach Apts Office on US 90	Existing: 26 (85) Predicted: 24 (79)	72	70	No-Build: 72 Alt. 2: 74 Alt. 4: 75 Alt. 5: 75	No-Build: Yes Alt. 2: Yes Alt. 4: Yes Alt. 5: Yes	No-Build: No Alt. 2: No Alt. 4: No Alt. 5: No
B	6-unit structure at Beavoir Beach Apartments	Existing: 38 (124) Predicted: 36 (118)	67	66	No-Build: 68 Alt. 2: 70 Alt. 4: 70 Alt. 5: 70	No-Build: Yes Alt. 2: Yes Alt. 4: Yes Alt. 5: Yes	No-Build: No Alt. 2: No Alt. 4: No Alt. 5: No

NAC Category	Location & Facility	Receptor Distance from US 90 (m [ft])	Desired Leq dBA as listed in 23 C.F.R. 772	Estimated Existing Leq dBA	Predicted Leq dBA	Does est. Leq dBA approach or exceed 23 C.F.R. 772 NAC?	Substantial impact criteria met (15 dBA)?
Immediately north of US 90 and the resort marina							
B	2 unit-cottage, Beavoir Beach Apart-ments*	Existing: 20 (67)	67	68	No-Build: 71 Alt. 2, 4, 5: Site improvements; existing demolished	No-Build: Yes	No-Build: No
B	Broadwater Beach Resort Hotel – Main bldg. & terrace – 33 units*	Existing: 24 (80)	67	73	No-Build: 74 Alt. 2, 4, 5: Site improvements; existing demolished	No-Build: Yes	No-Build: No
East of the resort and abutting US 90 on the north side							
B	Broad–water Gulf Hall Expo Center *	Existing: 16 (51)	67	75	No-Build: 75 Alt. 2, 4, 5: Site improvements; existing demolished	No-Build: Yes	No-Build: No
B	Broad–water Towers Hotel (71 units)*	For Existing: 52 (170)	67	69	No-Build: 70 Alt. 2, 4, 5: Site improvements; existing demolished	No-Build: Yes	No-Build: No
C	House of Chin Restaurant on US 90	22 (73)	72	71	No-Build: 72 Alt. 2: 74 Alt. 4: 74 Alt. 5: 74	No-Build: Yes Alt. 2: Yes Alt. 4: Yes Alt. 5: Yes	No-Build: No Alt. 2: No Alt. 4: No Alt. 5: No
C	Souvenir City / T-shirt World on US 90	11 (37)	72	76	No-Build: 77 Alt. 2: 78 Alt. 4: 78 Alt. 5: 78	No-Build: Yes Alt. 2: Yes Alt. 4: Yes Alt. 5: Yes	No-Build: No Alt. 2: No Alt. 4: No Alt. 5: No

NAC Category	Location & Facility	Receptor Distance from US 90 (m [ft])	Desired Leq dBA as listed in 23 C.F.R. 772	Estimated Existing Leq dBA	Predicted Leq dBA	Does est. Leq dBA approach or exceed 23 C.F.R. 772 NAC?	Does increase 15 dBA and thus constitute a substantial impact by exceeding?
Sadler Beach Drive							
B	Rodeway Inn	58 (191)	67	64	No-Build: 67 Alt. 2: 69 Alt. 4: 69 Alt. 5: 69	No-Build: Yes Alt. 2: Yes Alt. 4: Yes Alt. 5: Yes	No-Build: No Alt. 2: No Alt. 4: No Alt. 5: No

Source: Baker, 1999c.
* Site where levels exceeded/approached NAC levels only under the No-action Alternative.

Alternative 3

As discussed in Section 3.6, the ROI for Alternative 3 potentially encompasses thousands of noise-sensitive receptors. Therefore, the analysis predicted traffic noise impacts on a general or regional neighborhood basis.

The MDOT/FHWA STAMINA 2.0 Model was used to predict peak-hour traffic noise levels in 2010 for six segments of roadway serving as noise receptors for this analysis. These roadways were the primary roadways predicted to experience traffic volume changes as a result of implementing Alternative 3. A specified, existing noise level of 55 dBA was then subtracted from each predicted level to determine the magnitude of the noise level increase. (As described in Section 3.6.3, the areas surrounding the Alternative 3 sites were conservatively defined as typical, quiet, urban noise environments with maximum estimated existing daytime sound levels of 55 dBA Leq.)

Table 4.6-2 provides the predicted dBA increases for the affected streets. Since all increases over the existing level were less than 15 dBA, no substantial noise impacts as defined by MDOT policy are predicted for design year 2010. Furthermore, no predicted noise level approaches or exceeds the 23 C.F.R. 772 NAC level of 67 dBA for residential areas.

Table 4.6-2
Predicted dBA Increases for Peak Traffic Hour under Alternative 3

Noise Receptor	Current Sound Level	Predicted Sound Level	Increase	Does increase constitute substantial impact by exceeding 15 dBA?	Does estimated noise level approach or exceed 23 C.F.R. 772 NAC level of 67 dBA?
Bayview Avenue	55 dBA	62 dBA	7 dBA	No	No
Division Street	55 dBA	59 dBA	4 dBA	No	No
I-110	55 dBA	58 dBA	3 dBA	No	No
Lameuse Street	55 dBA	60 dBA	5 dBA	No	No
Lee Street	55 dBA	60 dBA	5 dBA	No	No
Howard Avenue	55 dBA	57 dBA	2 dBA	No	No

Source: Baker, 1999c.

No-Action Alternative

The calibrated MDOT/FHWA STAMINA 2.0 Model was run to predict the resultant traffic noise levels at the 70 receptor sites should none of the build alternatives be carried out. The model predicted that in the design year 2010, Leq noise levels at the receptor sites are expected to have increased 0 to 3 dBA over existing noise levels if the proposed project is not constructed. Since all increases over the existing level were less than 15 dBA, no substantial noise impacts as defined by MDOT policy are predicted for design year 2010.

The model does predict that the traffic noise level will approach or exceed NAC levels at 14 sites – four NAC Category C commercial sites and ten NAC Category B residential/hotel/motel sites. sites (see Table 3.6-1 in Chapter 3.6 for NAC Category descriptions). The data for these sites are presented in Table 4.6-1. Table 4.6-1 actually presents results for both the No-action Alternative and Alternatives 2, 4, and 5. However, the sites whose noise levels will approach or exceed NAC levels under both groups of alternatives are the same, except that the No-action Alternative would have four additional sites (shown in bold and asterisked in the table).

4.6.3 Impacts on Noise Conditions by Stationary/Area Sources

The operation of Alternatives 2, 3, 4, and 5 would result in stationary source noise generation from proposed entertainment/retail use, parking garages, hotels, and other uses. Specific noise sources include pedestrian (tourist) noise, landscaping equipment, delivery vehicles, and building heating, ventilation, and air conditioning (HVAC) systems.

Of primary concern in the analysis is the exposure of adjacent, noise-sensitive residential uses to stationary sound generated by parking garages, loading and unloading at proposed service areas and retail uses, amphitheaters, marinas, theme park activities, and periodic special events such as fireworks and outdoor music. The analysis also focuses on those proposed uses with the potential to generate the highest noise levels.

There are no specific noise regulations at the state level that directly apply to proposed stationary noise sources. Since Section 11, "Noise," of the City of Biloxi Ordinance, does not provide the appropriate decibel levels for noise sources (city of Biloxi, 1992), federal HUD guidelines are applied to sound levels generated from sources. According to Directive Number: 51.103, 24 C.F.R. Part 51, 51.103 Criteria and Standards, the HUD standards in Table 4.6-3 apply to all programs in terms of the measurement of external noise environments.

Table 4.6-3
HUD Standards For Stationary/Area Sources

Site Acceptability Standards	Day/Night Average (in dBA)	Special Approvals and Requirements
Acceptable	Not exceeding 65 dB (1)	None.
Normally Unacceptable	Above 65 dB but not exceeding 75 dB	Special Approvals (2) Environmental Review (3) Attenuation (4)
Unacceptable	Above 75 dB	Special Approvals (2) Environmental Review (3) Attenuation (5)

Source: HUD, 24 C.F.R. Part 51, 51.103 Criteria and Standards.
(1) Acceptable threshold may be shifted to 70 dB in special circumstances pursuant to Sec. 51.105(a).
(2) See Sec. 51.104(b) for requirements.
(3) See Sec. 51.104(b) for requirements.
(4) 5 dB additional attenuation required for sites above 65 dB but not exceeding 70 dB and 10 dB additional attenuation required for sites above 70 dB but not exceeding 75 dB. (See Sec. 51.104(a).)
(5) Attenuation measures to be submitted to the Asst. Secretary for CPD for approval on a case-by-case basis.
(Federal Register, 1979, rev. 1984).

Alternatives 2, 4 and 5

No on-site newly generated stationary or area source impacts are associated with Alternative 5. Alternatives 2 and 4 would result in the establishment of several stationary noise sources that have the potential to result in moderate-to-high peak noise levels at the adjacent noise-sensitive receptors lying north and northeast of the Alternatives 2 and 4 site. As a result, sound levels occurring may meet and/or exceed the 65 dBA Leq level (or DNL, if applicable) specified by HUD directive 24 C.F.R. Part 51 for residential housing north and northeast of the Alternatives 2 and 4 site. The Hurricane Water Park has the greatest potential to meet or exceed the noise criterion of 65 dBA Leq.

Other stationary noise sources are not expected to exceed the 65 dBA Leq criterion, although an increase in noise may be noticeable. In particular, sound levels from the proposed roller coaster are difficult to predict, since information about noise generated from roller coasters is rare. Subsequent investigations with park operators and ride manufacturers produced no useful sound level information. The following is a list of personal communications from interviews with such representatives:

- Noise levels for steel roller coasters located at Busch Gardens Park have never been tested (personal communication, Public Relations Representative, Busch Gardens Amusement Park, Tampa, FL, to Andrew Kuchta, Baker, September 28, 1999).

- Noise levels for steel roller coasters located at Busch Gardens Park have never been tested (personal communication, Public Relations Representative, Busch Gardens Amusement Park, Tampa, FL, to Andrew Kuchta, Baker, September 28, 1999).

- Noise levels for steel roller coasters located at Kennywood Park have never been tested (personal communication, Public Relations Representative, Kennywood Amusement Park, West Mifflin, PA, to Andrew Kuchta, Baker, September 28, 1999).

- Noise levels for steel roller coasters at Six Flags Park have never been tested (personal communication, Public Relations Representative, Six Flags Amusement Park, MD, to Andrew Kuchta, Baker, September 28, 1999).

- Cedar Point Park is located on a peninsula, so noise measurements are not needed (personal communication, Public Relations Representative, Cedar Point Amusement Park, Sandusky, OH, to Andrew Kuchta, Baker, September 28, 1999).

- Noise measurements are not taken into consideration when designing the steel roller coasters (personal communication, Engineer, A. Schilke, Arrow Dynamics, Clearfield, CT, to Andrew Kuchta, Baker, September 28, 1999).

- There are no standards for noise regulations for steel roller coasters or amphitheaters (personal communication, representative, American National Standards Institute, New York, NY, to Andrew Kuchta, Baker, September 28, 1999).

- Referred to the Department of Agriculture for noise issues regarding public facilities (personal communication, representative, PADEP, PA, to Andrew Kuchta, Baker, September 28, 1999).

- Referred to the Division of ride safety for noise issues dealing with roller coasters (personal communication, representative, Department of Agriculture, PA, to Andrew Kuchta, Baker, September 28, 1999).

- No noise tests conducted for noise levels concerning steel roller coasters (personal communication, representative, Division of Ride Safety, PA, to Andrew Kuchta, Baker, September 28, 1999).

- Never conducted any noise testing on amphitheaters or roller coasters (personal communication, noise specialist, M. Morello, Lewis Goodfriend and Associates, NJ, to Andrew Kuchta, Baker, September, 28, 1999).

Citizens have expressed concern over the proximity of the proposed amusement park to the cemetery that lies near the Alternatives 2 and 4 site. They feel that the sounds emanating from the amusement park would be incompatible with the solemn atmosphere of the cemetery grounds. As mentioned later in the mitigation section, design and placement will be the primary drivers in sound levels leaving the property boundaries to the cemetery. Cemeteries are difficult to categorize because human activity for long periods of time does not typically occur at these locations. Additionally, they are not specifically categorized in the 23 C.F.R. 772 regulations. The state of Utah, for example, places cemeteries under Category C (commercial sites, and/or those activities that do not fall under categories A or B) for the same human activity reason. (Noise Abatement, UDOT, 8A2-1. Effective November 6, 1987, Revised October 19, 1995.) Finally, time of day should also be considered a factor. It is likely that theme parks would not typically be operating in the early and mid-morning hours when funerals are occurring.

The operation of the amphitheater south of US 90 would likely constitute the single most significant on-site stationary source of noise for Alternatives 2 and 4. Amphitheater noise may be generated by special events such as concerts, shows, and fireworks displays.

Although available research on noise impacts from amphitheaters is rare, since most data relate to noise complaints after special events have taken place, Alternatives 2 and 4 would likely have minimal noise level impacts from operation of the amphitheater. Highway traffic noise on US 90 would mask sound levels of nearby stationary sources such as the amphitheater. Under the alternatives, the theater would face north, perpendicular to the residential area, and other on-site buildings would lie between the sound source and the potential receivers in the residential area. Furthermore, the nearest residential area, Beauvoir Beach Apartments, is located approximately 1,130 feet from the proposed amphitheater and north of US 90.

Noise from parking garages would consist of noise from vehicle exhaust systems, brake and tire squeal, and the opening and closing of doors and trunks. As these types of sounds do not last long enough for a quantitative evaluation – they are more of a temporary annoyance – they are typically not studied using Leq or DNL descriptors. US 90 would provide a buffer to parking garage noise sources and any potentially sensitive receptor areas located north of US 90. As a result, parking garage noise is not expected to affect sound levels at these sites.

Loading and unloading activities would be another source of stationary noise associated with Alternatives 2 and 4. Typical operations at loading docks involve trucks driving up, idling, maneuvering into the loading dock, unloading, and departing. Primary noise sources include truck-related engine, exhaust, brakes, and tire noises. Truck engines are normally shut off during actual unloading and loading.

The placement of these locations in relation to the sensitive receptors as well as time of day would determine potential impacts. Similar studies recorded peak noise levels in the range of 62 to 78 dBA at 50 feet for more than a dozen medium and heavy truck operations over short-term sound exposure levels (less than 30 seconds) (National Capital Planning Commission, 1999).

Occasional peak noise levels would occur when heavy trucks were braking, resulting in up to 80 to 82 dBA at 50 feet away over short-term periods.

Motorboat use at the proposed marina would be an additional source of stationary source noise. However, the marina would be on the southernmost side of the project site, south of both the amphitheater and US 90. Similar to parking garage sound levels, sound levels associated with marina activities would be more than 1,100 feet from the nearest receptor site, with intervening structures between the source and the receiver.

Alternative 3

Alternative 3 would result in stationary noise sources similar to those identified for Alternatives 2 and 4. Parking garages would result in noise from vehicle exhaust systems, brake and tire squeal, and the opening and closing of doors and trunks. The Alternative 3 sites would include a parking garage at each site, so the noise levels generated by these sources would be more dispersed in comparison to the multiple garages proposed under Alternatives 2, 4, and 5. The amphitheater proposed at Sites C and F would be the most significant cause of sound levels generated by the parking garages.

As with Alternatives 2 and 4, loading and unloading activities and motorboats are other stationary noise sources that would be associated with the Alternative 3 sites. The potential impacts of loading and unloading activities would largely be determined by time of day and placement of these activities in relation to noise-sensitive receptors. All marinas would be on the southernmost side of the project site and more than 1,100 feet from the nearest receptor site with intervening structures situated between the source and the receiver.

Overall, the noise sources generated under Alternative 3 would have the potential to result in moderate-to-high peak noise levels at the adjacent noise-sensitive receptors to the north and northeast of the existing resort location. Sound levels may meet and/or exceed the HUD standard of 65 dBA Leq in adjacent residential areas, primarily as a result of the amphitheater activities at Sites C and F. Site C is the closest to a residential area near the intersections of Michael Boulevard, Pine Street, and 8th Street. Therefore, Site C would have the greatest potential impact on noise conditions under Alternative 3.

Other noise sources generated by the Alternative 3 would not meet or exceed the criteria and only would be noticeable if not controlled at the source.

No-Action Alternative

The No-action Alternative assumes that no additional development of amusement parks or major noise generators would occur on the project site. This alternative would most likely have the same background stationary/area sound levels as in the existing condition, including pedestrian (tourist) noise, existing commercial business activities, marine activity noise, and overflights from Keesler AFB. Also, the highway traffic sound levels would most likely still be the primary source of noise in the sound level environment.

4.6.4 Mitigation

MDOT has adopted the following FHWA policy regarding land use development and future noise abatement:

> "The Federal Highway Administration will not normally participate in noise abatement measures unless there is construction or reconstruction of a highway section (or portion thereof). However, the Federal Highway Administration may participate in noise abatement measures on an existing highway where land development or substantial construction predated the existence of any highway. The granting of building permit, filing of a plat plan, or a similar action must have occurred prior to right-of-way acquisition or construction approval for the original highway." (MDOT, 1998)

Several types of mitigation may be studied for areas near the proposed alternatives that may warrant consideration for noise abatement. They are listed as follows:

4.6.4.1 Traffic Management Measures

Traffic management measures considered for the "build" alternatives include reductions in speed and truck restrictions. Truck restrictions could be employed for delivery times, especially for Alternative 3, where travel through local streets is more likely. However, because a substantial decrease in speed would be needed to provide a noticeable sound level reduction, speed reduction is not considered an effective mitigation measure. For example, a 16 kph (10 mph) speed reduction would result in only a 2-dBA decrease in sound levels.

4.6.4.2 Horizontal/Vertical Realignment

Horizontal and vertical realignments were investigated as a mitigation measure to minimize any noise impacts as a result of the "build" alternatives. However, these measures were deemed infeasible for several reasons. For Alternatives 2, 4, and 5, any vertical change to US 90 would present a development boundary from both the Gulf of Mexico and the proposed development itself. Vertical and/or horizontal realignment of the ramps would not have any effect on the sound level environment because the primary noise source is the US 90 mainline. For Alternative 3, vertical and/or horizontal changes to the local street system is impractical because it would require the taking of nearby structures if the roadways were to be shifted away from any noise-sensitive areas.

4.6.4.3 Additional Acquisition for Abatement Features

Additional acquisition for abatement features would be considered infeasible because of the proximity to roadways. The benefited receptors would need to be acquired for the barrier placement, thereby voiding the need for the barrier in the first place.

4.6.4.4 Noise Barriers

A generalized noise barrier analysis for all areas warranting noise abatement consideration under the MDOT policy found no feasible or reasonable traffic noise abatement measures that would eliminate or reduce the expected NAC traffic noise impacts associated with Alternatives 2, 4, and 5. The noise-receptor sites that are expected to have traffic noise impacts are located along sections of US 90 that do not have limits on the number of ingress and egress points. Additionally, line-of-sight and clear recovery zones would also render any solid structure abatement feature ineffective. Solid continuous barriers need to be constructed because any opening required for access and safety would compromise the predicted sound level reduction by reducing the reduction of sound energy levels provided by a continuous barrier.

4.6.4.5 Stationary/Area Sources

Mitigation for these sources is typically established by instituting decibel limits and curfews for events. Overall, noise mitigation will not be required if the decibel levels are restricted to no more than 65 dBA at the property line and a curfew of 10 PM is established. The 65 dBA satisfies HUD Directive Number: 51.103, 24 C.F.R. Part 51. Managing the sound systems at each event would protect these guidelines by controlling sound levels at the source so that levels above or equal to 65 dBA Leq (or DNL, if between 10 PM and 7 AM) will not occur outside the property boundary. This is accomplished at other locations in the U.S. and can easily be instituted for this project. Two examples are listed below:

- Fiddler's Green Amphitheater. Location: Greenwood Village, south of downtown Denver. Opened: 1982. Capacity: 17,000, including 7,000 fixed seats, none covered. Decibel limit: 65 decibels in neighborhood near amphitheater. Curfew: 10 PM & cannot start before 6 PM without permission. Number of performances: 1998: 32, with five sellouts. Average attendance: 12,000 to 13,000. Mostly pop music performances. (The Noise Pollution Clearinghouse, 1999.)

- Polaris Amphitheater. Location: 12 miles north of Columbus, Ohio. Opened: 1994. Capacity: 20,000, including 6,500 reserved seats, most of them covered. Decibel limit: 100 decibels 96 feet from stage. 65 decibels at property line. Curfew: 11 PM. Number of performances, 1998: 26, with three sellouts. Average attendance: 10,000. Mostly pop music performances. (The Noise Pollution Clearinghouse, 1999.)

4.6.4.6 Unloading/Loading Operations

For the Proposed Action and its alternatives involving unloading/loading operations, the following mitigation measures are recommended:

- design and placement of loading/unloading areas or platforms away from residential areas.
- design of intervening buildings and structures between the source and potential receivers to act as noise barriers.
- control operations to times outside the 10 PM-7 AM window during the week and limit weekend operations.
- provide visual barrier along the property boundary for screening purposes.
- integrate vegetative screening in addition to solid barrier structures.

4.6.4.7 Mitigation Measures for Hurricane Park

For the Proposed Action and Alternatives 4 and 5 that include the Hurricane Park component, the following mitigation measures are recommended:

- design and placement of rides as far as possible from the nearest sensitive receptors.
- control operations to ride times outside the 10 PM-7 AM window, especially if a roller coaster is planned, because it would be unreasonable and unfeasible to construct a barrier for roller coaster noise.
- provide visual barrier along the property boundary for screening purposes.
- integrate vegetative screening in addition to solid barrier structures.
- coordinate the planning and scheduling of events involving fireworks displays, parades, festivals, and other noise-generating activities with the city, county, and state to minimize adverse impacts to adjacent residential areas, especially traffic control.
- design and install sound systems to control sound levels at the source so that sound levels above or equal to 65 dBA Leq (or DNL, if between 10 PM and 7 AM) will not occur outside the property boundary.

For potential garage noise, the following mitigation measures are recommended:

- design and placement of ingress/egress away from the nearest sensitive receptors.

- incorporate abatement measures such as louvers on the receptor sides of all floors that are above the ground level to reduce the potential for stationary noise impacts associated with the proposed parking garage. This does not apply to the parking garages located south of US 90.

- coordinate the planning and scheduling of events involving fireworks displays, parades, festivals, and other noise-generating activities with the city, county, and state to minimize adverse impacts to adjacent residential areas, especially in regard to traffic.

- installing a pre-pay system for high-traffic events, to facilitate the exit of cars and thus reduce the amount of queuing and engine idling.

4.6.4.8 Construction Mitigation Measures

Construction activities at the sites of the Proposed Action or its alternatives would be required to comply with all state and local sound control regulations and ordinances. As mentioned earlier, the Biloxi Code contains a series of construction time ordinances under Section 11-1-4 (9) that address the creation, demolition, alteration, and repair of any buildings during certain time periods on certain days.

Additionally, MDOT's Traffic Noise Policy (MDOT, 1998) states that the following noise abatement measures will be incorporated in the contract plans and specifications in order to prevent adverse construction noise impacts in the vicinity of the proposed project:

- The contractor shall comply with all state and local sound control and noise level rules, regulations, and ordinances that apply to any work performed pursuant to the contract.

- Each internal combustion engine used for any purpose on work related to the project shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without such a muffler.